

What Is Claimed Is:

1. A vehicle comprising:

an integral transaxle apparatus for driving and steering a vehicle, including;
a housing,

5 a driving hydrostatic transmission having a variable displacement first hydraulic pump and a first hydraulic motor fluidly connected with each other, said driving hydrostatic transmission being disposed in said housing, wherein said first hydraulic pump receives power of a prime mover and has a first movable swash plate,

10 a steering hydrostatic transmission having a variable displacement second hydraulic pump and a second hydraulic motor fluidly connected with each other, said steering hydrostatic transmission being disposed in said housing, wherein said second hydraulic pump receives power of said prime mover independently of said first hydraulic pump and has a second movable swash plate,

15 a pair of axles disposed co-axially with each other and supported in said housing, and

a differential unit differentially connecting said axles with each other, said differential unit being disposed in said housing, wherein said differential unit is driven regularly or reversely by the output of said driving hydrostatic transmission and differentially drives said axles while receiving the output of said steering hydrostatic transmission;

20 manually operable driving operating means disposed on said vehicle apart from said transaxle apparatus for slanting operation of said first movable swash plate for switching the travelling direction between forward and backward and changing the travelling speed; and

25 manually operable steering operating means disposed on said vehicle apart from said transaxle apparatus for slanting operation of said second movable swash plate so as to determine the leftward and rightward cornering angle, wherein said vehicle turns laterally in the same direction of leftward and rightward steering

operation of said steering operating means whether said vehicle travels forward or backward.

2. The vehicle as set forth in claim 1, wherein said second hydraulic motor is of a variable displacement type and has a third movable swash plate, said third
5 movable swash plate interlocking with said driving operating means so that the slanting direction of said third movable swash plate is changed oppositely with respect to its neutral position according to the travelling direction switching operation of said driving operating means.

3. The vehicle as set forth in claim 2, wherein said first movable swash plate
10 is kept in a neutral position while said driving operating means is operated for forward travelling or for backward travelling to some degree from a neutral position.

4. The vehicle as set forth in claim 3, wherein said third movable swash plate
15 is slanted to a certain degree in a direction corresponding to forward travelling when said driving operating means is located in its own neutral position.

5. The vehicle as set forth in claim 4, wherein said third movable swash plate
is changed in its slanting direction from that for forward travelling to that for
backward travelling according to the operation of said driving operating means
from its own neutral position into its range for backward travelling while said first
20 movable swash plate is kept in its own neutral position.

6. The vehicle as set forth in claim 4, wherein said third movable swash plate
is kept at said certain degree while said driving operating means is operated for
forward travelling within the range to keep said first movable swash plate in its own
neutral position.

7. The vehicle as set forth in claim 1, wherein said second hydraulic motor is of a variable displacement type and has a third movable swash plate, said first hydraulic motor is of a variable displacement type and has a fourth movable swash plate, and said driving operating means comprises manually operable forward/backward travelling direction switching means and manually operable speed changing means, said forward/backward travelling direction switching means interlocking with both of said third movable swash plate and said fourth movable swash plate so as to change the slanting directions of said third and fourth movable swash plates oppositely with respect to their neutral positions, according to the switching operation of said forward/backward travelling direction switching means, and said speed changing means interlocking with said first movable swash plate so as to vary the slanting angle of said first movable swash plate according to the operational degree of said speed changing means.

8. The vehicle as set forth in claim 7, wherein said first movable swash plate is kept in a neutral position while said speed changing means is operated to some degree from a neutral position.

9. The vehicle as set forth in claim 8, wherein said third movable swash plate is slanted to a certain degree in a direction corresponding to forward travelling when said speed changing means is located in said neutral position.

10. The vehicle as set forth in claim 8, wherein said third movable swash plate is changed in its slanting direction from that for forward travelling to that for backward travelling according to the switching operation of said forward/backward travelling direction switching means for backward travelling and the operation of said speed changing means from said neutral position to some degree, while said first movable swash plate is kept in a neutral position.

11. A vehicle comprising:

manually operable steering operating means, and
a caster interlocking with said steering operating means so as to be
swivelled in relation to said vehicle by operation of said steering operating means,
wherein said caster is restricted in its range where it can be freely swivelled.

5 12. The vehicle as set forth in claim 11, further comprising:
 a caster guide interposed between said caster and said vehicle,
 wherein said caster guide interlocks with said steering operating means so as to be
 swivelled in relation to said vehicle by operation of said steering operating means,
 wherein said caster is laterally rotatably supported to said caster guide while being
10 restricted in its range of free swivelling in relation to said caster guide.

13. The vehicle as set forth in claim 11, further comprising:
 a transaxle apparatus supporting a pair of driving axles, wherein said driving
 axles are differentially driven by operation of said steering operating means.

14. A vehicle comprising:
15 an integral transaxle apparatus for driving and steering a vehicle,
 including;
 a housing,
 a driving hydrostatic transmission having a variable displacement
 first hydraulic pump and a first hydraulic motor fluidly connected with each other,
20 said driving hydrostatic transmission being disposed in said housing, wherein said
 first hydraulic pump receives power of a prime mover and has a first movable
 swash plate,
 a steering hydrostatic transmission having a variable displacement
 second hydraulic pump and a second hydraulic motor fluidly connected with each
25 other, said steering hydrostatic transmission being disposed in said housing,
 wherein said second hydraulic pump receives power of said prime mover
 independently of said first hydraulic pump and has a second movable swash plate,

a pair of axles disposed co-axially with each other and supported in said housing, and

a differential unit differentially connecting said axles with each other, said differential unit being disposed in said housing, wherein said differential unit is driven regularly or reversely by the output of said driving hydrostatic transmission and differentially drives said axles while receiving the output of said steering hydrostatic transmission;

manually operable driving operating means disposed on said vehicle apart from said transaxle apparatus for slanting operation of said first movable swash plate for switching the travelling direction between forward and backward and for changing the travelling speed;

manually operable steering operating means disposed on said vehicle apart from said transaxle apparatus for slanting operation of said second movable swash plate so as to determine the leftward and rightward cornering angle; and

a caster interlocking with said steering operating means so as to be swivelled in relation to said vehicle by operation of said steering operating means, wherein said caster is restricted in its range where it can be freely swivelled.

15. The vehicle as set forth in claim 14, further comprising:

a caster guide interposed between said caster and said vehicle, wherein said caster guide interlocks with said steering operating means so as to be swivelled in relation to said vehicle by operation of said steering operating means, wherein said caster is laterally rotatably supported to said caster guide while being restricted in its range of free swivelling in relation to said caster guide.